



Original communication

Patterns of infant mortality in Kuwait from 2003 to 2006



Salah Al-Waheed, MD, FRCPC Assistant Professor of Pathology ^{a,*},
Nadia Al-Kandary, PhD Director of the Forensic Pathology Unit ^b

^a Faculty of Medicine, Kuwait University, Kuwait

^b General Department of Criminal Evidence, Ministry of Interior, Kuwait

ARTICLE INFO

Article history:

Received 3 February 2013

Accepted 27 September 2013

Available online 16 October 2013

Keywords:

Infant mortality rate

Natural causes

Un-natural causes

Kuwait

ABSTRACT

Infant death is often tragic, particularly in the Arab World, where infants, especially males, are supposed to carry their family's names due to ancient cultural traditions. The conditions and events that may be associated with infant death are extremely varied. Infants may die from either congenital disorders or natural diseases, or may pass away as a consequence of a complicated delivery.

Infants are also victims of accidents and violence such as homicides.

The main aim of this study was to investigate the reported medico legal cases of infant mortality in Kuwait due to natural and un-natural causes between 2003 and 2006.

The average IMR rate in Kuwait during the study period was better than the IMR average for developing countries and the IMR average for the world during the same study period. In general, these figures for Kuwait are even better than the average for Middle East and North Africa.

More medico- legal cases were reported for deaths among Kuwaiti infants in 2004, 2005 and 2006 compared to non Kuwaiti infants. More Kuwaiti infants died due to RTA and domestic accidents. In contrast, only non Kuwaiti infant died from infanticide.

© 2013 Elsevier Ltd and Faculty of Forensic and Legal Medicine. All rights reserved.

1. Introduction

Infant death is often tragic, particularly in the Arab World, where infants, especially males, are supposed to carry their family's names. This is due to strong ancient cultural beliefs. The conditions and events that may be associated with infant death are extremely varied. Infants may die from either congenital disorders or natural diseases, or may pass away as a consequence of a complicated delivery. Infants are also victims of accidents and violence such as homicides. Infants that are small in size and physically weak are relatively susceptible to disease as well as violence.¹

There are over 130 million babies born every year, and more than 10 million infants die before their fifth birthday.² Infant mortality emerges as an increasingly prominent issue for society as a whole, and hence, information on such mortality at an international level is in great demand.³

The overall infant mortality rates (IMR) in most countries have been declining in the last decade. The lowest ever IMR in the United

States was recorded in the year 2006, and was reported as 6.9 deaths per 1000 live births.⁴ Despite such decline, the magnitude of the infant mortality rate continues to pose a significant challenge to society and the public health system.⁵ Infant mortality is one of the most widely used indicators of a population's health.⁶ It is believed that factors associated with an improvement in IMR are related to the standards of health service and education in the community.^{7,8} In addition, one of the national health objectives for the year 2008 was to reduce the IMR for the total population to less than or equal to 7 infant deaths per 1000 live births. In Kuwait, Infant deaths cases are transferred to the Forensic Medicine Department (FMD) to investigate the cause of death, which can be established via a variety of investigations including examination of the crime scene, autopsy, and chemical analysis tests.

This was a retrospective study which investigated the causes, demographics, frequency and occurrence of prenatal, neonatal and post neonatal mortality in Kuwait, including deaths due to natural and un-natural causes from 2003 to 2006. The study determined the number of such cases and their ratio regarding the total cases referred to the Forensic Medicine Section, in addition to recording of all statistical pathological and medico-legal findings. We also compared our results with neighboring countries within the region and other non-neighboring countries.

* Corresponding author.

E-mail addresses: salah.w@hsc.edu.kw, salah.alwaheed@gmail.com (S. Al-Waheed).

2. Materials

The materials of this study had been obtained from three sources:

The Kuwait Health Organization registrations files of the data related to birth rate, neonatal and infant deaths. These data included all the registered data obtained from all neonatology and maternity centers in Kuwait whether they were related to public health or private services. It was noted during this study that not all of this data especially perinatal deaths were of medico-legal cause.

The second source of the research data were collected from the cases referred by justice and police authorities to General Department of Criminal Evidences (GDCE), and had been examined by the medical examiners of Medico-legal (Forensic) section.

The third group of our materials included the cases that had been referred to Pathology Department for gross and microscopic examinations of specimens in order to find the underlying aetiological factors that related to the cases. All other materials and facilities were available at the GDCE in Kuwait.

3. Methods

This project was a retrospective study which involved data of infant mortality in Kuwait from 2003 to 2006. The data were collected from the Department of Forensic Medicine, an affiliated section of the General Department of Criminal Evidence (GDCE) in the Ministry of Interior, Kuwait. The selected cases in this study included all cases of Infant deaths referred to the Forensic Medicine Department. The causes of death in each case were classified as either natural or un-Natural. The sub-category in each type is shown in Table 1. The research investigation included all available data obtained from each case including autopsy findings and Pathology and Medico-legal data.

3.1. Collection of samples and referral policy

The referral of each infant death case to the Forensic Practice Department was based on the following circumstances, criteria and policies:-

- a) Cases of infant deaths that were received from the hospitals in which the circumstances of death were un-known or considered to be sudden infant death syndrome (SIDS).
- b) Some cases of Infant deaths involving abandoned newborns, intrauterine fetal deaths, still births, infanticides, sudden infant deaths and child abuse.
- c) Cases of infant death due to unfortunate medical procedures and problems such as delivery, operation, miss-treatment, miss-management etc.

Table 1
Causes of infant death cases received at GDCE from 2003 to 2006.

Natural causes	Unnatural causes
Some causes of natural infant deaths	Road traffic and domestic accidents
Stillbirth	Infanticide
Infections	Burn
SIDS	Drowning
Premature birth and deep neonatal jaundice	Electric shock
Maturation defect and congenital abnormalities	Fall heavy objects over
Congenital heart disease	
Acute respiratory distress	
Dehydration	

Infant Mortality in Kuwait during 2003-2006

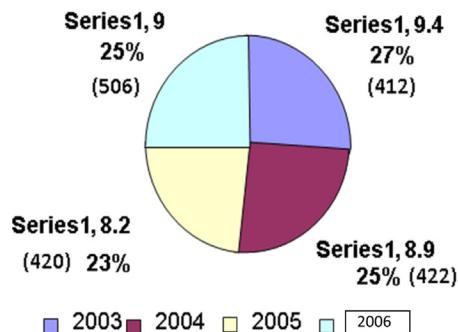


Fig. 1. A pie chart of the infant mortality rate (expressed as a percentage) per 1000 in Kuwait from 2003 to 2006.

- d) Cases of infant deaths due to road traffic and domestic accidents and/or any criminal cases in the house area.
- e) Cases of infant murder (Homicides, infanticide etc).

These cases were referred to the Department to ascertain the facts pertaining to death and to investigate whether they were due to either natural cause or violent origin, in which the objectives of post-mortem examination were only to find out the cause of death. These cases were reported to the Police and referred to the Public Prosecutor, who referred them to the Forensic Medicine Department, requesting the conduction of post-mortem examinations.

3.2. Data collection and preparation

A total of 220 reported infant death cases were referred for Medico-legal examination out of 1760 infant death cases received in Kuwait health organization centers during the period January 2003 through December 2006 and they constituted the material of this study. In order to identify the cause of death in each case, full review of the following data has been made including: clinical and epidemiological data, scene examination, radiographic investigations and complete autopsy study including histopathological examination and toxicological screening in order to identify the cause of death in each case. Statistical records on infant deaths from the Ministry of Health during that period were also obtained.

3.3. Data collection and statistical analysis

This was a retrospective research study for the period 2003 to 2006 and all the data were related to the deaths of infants whose ages were either one year or less in Kuwait. The data were retrieved from the Archives of the Department of Forensic Medicine, a sub sector of General Department of Criminal Investigation in the Ministry of Interior in Kuwait. The details relating to the total death of males and females in Kuwait during the study period were obtained from Kuwait Statistics Department, Ministry of Planning.

All definitions employed in this study were those previously used by WHO and UNICEF. Infant mortality rates (IMR) could be defined as the probability of dying between birth and exactly 1 year of age expressed per 1000 live birth for the year.

Data analysis was analyzed using SPSS 16.0 (Chicago USA) and Med Calc statistical analysis method. Descriptive statistics were used to show the percentage of reported medico-legal cases in

different categories according to year. Chi square test was used to find the association between qualitative variables.

4. Results

Fig. 1 shows a pie chart of the infant mortality rate (expressed as a percentage) per 1000 in Kuwait from 2003 to 2006. The actual numbers for the four years are also shown between brackets. The data reveal that infant mortality rate in Kuwait in 2003 was 9.4 infant deaths per 1000 live birth and this was not significantly ($p > 0.05$) different from the infant mortality rate in either 2004 (8.9), 2005 (8.2) or 2006 (9.0) except for a small decrease in 2005.

Fig. 2 shows the total number of infant deaths in Kuwait and number of reported medico-legal (ML) cases of infant deaths to GDCE in Kuwait between 2003 and 2006. The results reveal that for each year about 12–14% of all cases of infant deaths were reported. Moreover, more infants died in 2006 compared to 2003, 2004 and 2005 but the increase was not statistically different ($p > 0.05$) from the other 3 years during when the number of infant deaths remained more or less the same. The data also shows that more cases were reported to the Forensic Department in 2006. This was probably due to the fact that more infants died during 2006. Interestingly, the results also showed that significantly ($p < 0.05$) less cases were reported to the medico-legal team in the Forensic Department compared to the total number of infant deaths each year.

The results in Fig. 3 show that significantly ($p < 0.05$) more Kuwaiti infants died between 2003 and 2005 compared to non-Kuwaiti infants except for 2006 when the number was more or less the same for Kuwaiti and non-Kuwaiti infants. However, there data for the 4 years for either Kuwaiti or Non-Kuwaiti infant deaths show no statistical significant difference ($p < 0.05$) between one another.

Fig. 4 shows the number of reported medico-legal cases of deaths among infant boys and infant girls due to natural and unnatural causes in Kuwait between 2003 and 2006. The results show a gradual increase in the number of deaths for boys from 2003 (29) to 2006 (41). In contrast, there was a small decrease in the number of reported cases for girls from 2003 (25) to 2006.¹⁸ However, these data are not significantly different from one another. Interestingly, the data also shows a marked increase in the number of infant boys (37 and 41) who died from natural and unnatural causes comparing the number of infant girls (17 and 18) in 2005 and 2006, respectively.

Fig. 5 shows the number of reported medico-legal cases of infant deaths due to natural compared to un-natural causes in Kuwait

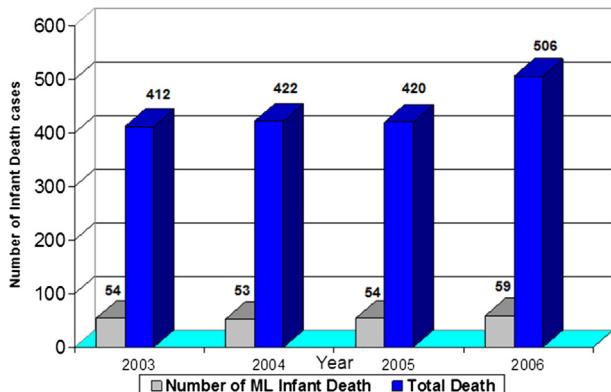


Fig. 2. The total number of infant deaths in Kuwait and number of reported medico-legal (ML) cases of infant deaths to GDCE in Kuwait between 2003 and 2006.

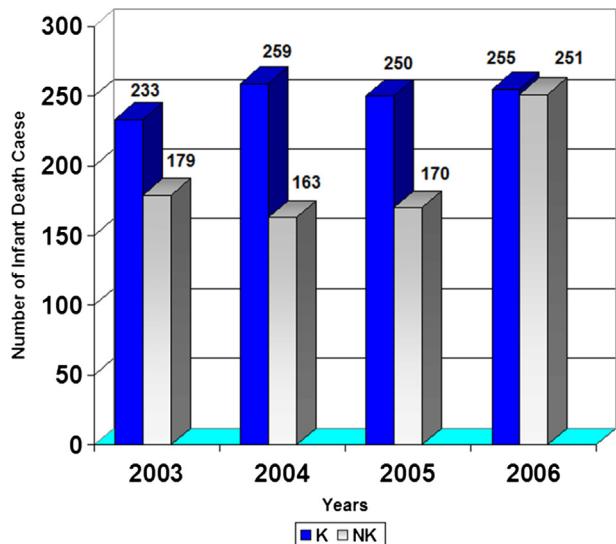


Fig. 3. Infant deaths from 2003 to 2006 between citizens and non-citizens.

between 2003 and 2006. The results show that the number of infants who died as a result of un-natural causes increased slightly from 2003¹⁹ to 2006 (25). In contrast, the number of infants who died from natural causes remained more or less the same for the 4 years. Interestingly, the data also show that markedly more infants died from natural compared to un-natural causes.

5. Discussion

This study was designed to investigate the reported medico-legal cases of infant mortality at the Forensic Department of the Ministry of Interior in Kuwait between 2003 and 2006. The results presented in this study highlighted a number of interesting details regarding infant mortality. This discussion will be focused on the prevalence of infant mortality in Kuwait, reported medico-legal cases, natural and un-natural causes of infant deaths, gender and nationalities. Moreover, the discussion will address briefly the

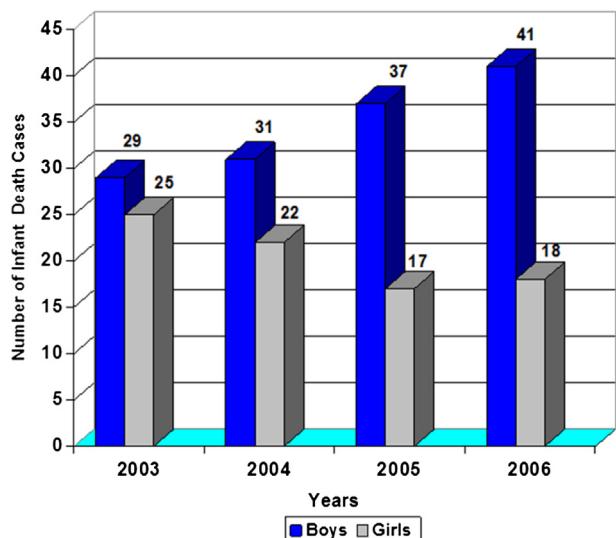


Fig. 4. The number of infant deaths with respect to gender.

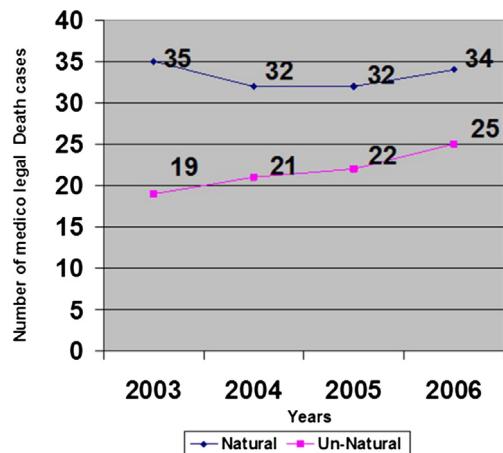


Fig. 5. The number of medico-legal deaths due to natural compared to un-natural causes.

relationship between infant mortality rate (IMR) and literacy rate (LR) in the Arab Countries with particular attention to Kuwait.

5.1. Prevalence of infant mortality rate in Kuwait

Infant mortality rate in Kuwait in 2003 was 9.4 infant (under 1 year of age) deaths per 1000 live birth, and this was not significantly different from the infant mortality rate of Kuwait in 2006 which was determined to be 9 infant deaths per 1000 live births.⁹ The infant mortality rate of Kuwait in 1998 was 12 and in 2007 it were 10.5 infant deaths per 1000 live births according to W.H.O.^{10,11} The average IMR rate (a value of 9) in Kuwait during the study period was much better than the IMR average for developing countries during the study period (a value of 57.5) and the world IMR average (52.25) in general.¹⁰ These figures are even better than and the average for countries in the Middle East and North Africa (a value of 42) infant deaths per 1000 live births.¹²

5.2. Reported medico-legal infant death cases

There have been inexplicable fluctuations in the reporting of infant death cases. Approximately 57.7% of the reported medico-legal death cases constituted Kuwaitis, while 42.3% constituted non-Kuwaitis. Overall, 62.7% were males and 37.3% were females. There is an increasing trend in total infant mortality in Kuwait, more so among infant males. More infants died in 2006 compared to other previous years. On the contrary, there is a puzzling and a decreasing trend in the total reported medico-legal cases of infant mortality in Kuwait. To explain further, according to Kuwait's Government Statistics, the reported medico-legal cases decreased from 13.1% in 2003 to 11.7% in 2006. The reported medico-legal cases decreased from 13.1% in 2003 to 12.6% in 2004. But it increased to 12.9% in 2005 and subsequently, decreased to 11.1% in 2006. There were fluctuations during the study period though there is no statistical significant decrease in the reported medico-legal cases of infant mortality. This could be due to the fact that people are not complaining about the causes of deaths because they are prone to accept the final verdict issued by hospital officials. Furthermore, in certain cases, hospital authorities could only pronounce death by observable indicators and such cases were not referred to the Forensic Department where an autopsy would be performed. The standardization of reporting and the training of all medical personnel that may have contact with a deceased individual must be uniformed to prevent such discrepancies.

5.3. Manner and cause of infant death

The present study highlighted upon the natural and un-natural causes of infant deaths. The majority of the mysterious infant death investigations in this study were due mainly to natural causes. Medical Examiners normally classified the causes of deaths by conducting an excessively routine investigation and reported the causes as either natural or un-natural. The reported medico-legal cases of infant deaths due to natural and un-natural causes are further sub-classified into different groups. Natural causes include stillbirth, infections, premature birth, congenital abnormalities/anomalies and SIDS. In contrast, un-natural causes constitute medico-legal cases of infant deaths due to road traffic accidents (RTA), domestic accidents and infanticide.

5.4. Natural causes of infant death

In the present study the reported medico-legal cases of infant deaths due to such natural cause as infections claimed 39.1% of total reported cases of infant mortality during the study period. Reported medico-legal cases of infant deaths due to infections increased from 31.4% in 2003 to 50% in 2006. In 2004, infant mortality due to infections increased to 46.9% but in 2005 infant deaths due to infections showed a decrease and reached a value of 28.1%. Infections represent the highest percentages in terms of infant mortality of reported cases. Infections were responsible for the largest number of reported medico-legal cases of infant deaths due to natural causes and this required it to be the subject of deeper and more careful analysis. With respect to this particular cause of child death, much could be done by parents and care takers. But families alone should not be held responsible for such death. All too often, parents do not have sufficient information to perceive the unhealthy hazards that their infants face and they do not know how to react to such situation. Conducting campaigns, seminars, workshops on how to avoid accidents and teaching adequate preventive methods to treat infections are ways of raising awareness.^{13,14}

The results of this study showed that Stillbirth claimed 15.79% of total infant deaths due to natural causes during the study period. However, reported medico-legal cases of stillbirth decreased from 17.1% in 2003 to 14.7% in 2006. The stillbirth percentage went up from 12.5% in 2004 to 18.8% in 2005, respectively. Reported medico-legal cases of infant deaths due to premature birth and congenital abnormalities claimed 16.54% of the total reported cases during the study period. The reported cases of infant deaths due to premature birth and congenital anomalies were 25.7% in 2003 and this percentage decreased to 15.6% in 2004, remained stable in 2005 and subsequently, decreased further to 8.8% in 2006. The decrease of death rate due to congenital anomalies is a welcoming factor. This could be due to the increase of literacy in the region and the existing programmes sponsored by the Ministry of Health. Because genetic pre-screening is more common amongst the more educated classes, a blood test prior to marriage has been made compulsory in the country.

The results also showed that the reported medico-legal cases of infant deaths due to SIDS claimed 28.57% of total reported cases of deaths due to natural causes. SIDS showed an increase from 25.7% in 2003 to 26.5% in 2006. However, in 2004 this rate went up to 25% and in 2005 the rate again increased to 37.5%. However, there was no significant increase or decrease ($p > 0.05$) in the various causes during 2003–2006.

5.5. Un-natural cause of infant death

Infant deaths due to un-natural causes consist of road traffic accidents (RTA), domestic accidents and infanticide. One of the

leading causes of death and disability in the Middle East is road traffic injuries. The World Health Organization estimated that by 2020, road traffic injuries will be the third leading cause of disability adjusted years of life lost worldwide.¹⁵ The analysis by the International Road Federation's world road statistics found that five countries in the Middle East are among the highest road traffic death rates in the world. Their study showed that the United Arab Emirates, Oman, Saudi Arabia, Qatar, and Kuwait all had more than 18 deaths per 100,000 people in 2000. Road accidents claimed the lives of 22.6% of total reported medico-legal cases of infant deaths due to un-natural causes and the rate showed a slight decrease from 36.8% in 2003 to 36% in 2006. Reported cases due to RTA went down to 33.3% in 2004 and in 2005 it further declined to 31.8%. But the reported cases due to RTA went up to 36% in 2006.

The data of this study showed that the total reported medico-legal cases of infant deaths due to un-natural domestic accidents were 24.1% in Kuwait compared to the other causes. This rate increased from 31.6% in 2003 to 32% in 2006. However, in 2004 and 2005 this rate was 47.6% and 36.4%, respectively. The RTA and domestic accidents together claimed 71.6% of the total reported medico-legal cases of infant deaths due to un-natural causes in Kuwait during the study period. Prevention of these causes of the infant mortality would have resulted in a remarkable decline in IMR in Kuwait. Interrogations concerning either crime or accidents scene always revealed that the Kuwaiti parents were not present at the time of the accident or were found to be missing in the scene of accidents. Kuwaiti households usually have two or three housekeepers in their homes, as the labor laws permit cheap labor from Asian Countries. Kuwaiti parents often departed from the home, leaving their children under the full responsibility of housekeepers.¹⁶ Currently, parents are not charged with negligence, as is common in other industrialized nations. Furthermore, enforcement of existing laws of culpability could prevent accidental infant deaths in the domestic arena. The laws should require that child care-providers be trained and licensed; thus, the Government can hold parents accountable for and with whom they leave their children with as guardian.

5.6. Reported medico-legal cases of infant deaths due to natural causes according to nationality

The reported medico-legal cases of deaths due to natural causes among Kuwaiti infants increased from 42.9% in 2003 to 67.65% in 2006. In contrast, the reported medico-legal cases of infant deaths due to natural causes decreased for girls from 57.1% in 2003 to 32.35% in 2006. The reported cases of male infant deaths due to natural causes in Kuwait increased to 67.65% in 2006 compared to 42.9% in 2003. In contrast, the reported medico-legal cases of infant deaths due to natural causes among non-Kuwaiti infants decreased to 32.35% in 2006 compared to 57.1% in 2003. In 2004 and 2005, the reported medico-legal cases of non-Kuwaiti male infant deaths due to natural causes were 65.6% and 68.75%, respectively. In 2004 and 2005 the reported medico-legal cases of non-Kuwaiti female infant mortality was 34.4% and 31.25%, respectively. Together, the results showed no statistical significant ($p > 0.05$) trend in infant deaths due to natural causes among Kuwaiti and non-Kuwaiti Citizens in 2003 compared to values for 2004, 2005 and 2006.

5.7. The reported medico-legal cases of infant deaths due to un-natural causes according to nationality in Kuwait

In the reported medico-legal cases of infant deaths due to un-natural causes and according to nationality, 46 infants were Kuwaitis (52.87%) and 41 were non-Kuwaiti infants (47.13%). The percentage of the reported medico-legal cases of infant deaths due

to un-natural causes among Kuwaiti infants decreased from 47.4% in 2003 to 44% in 2006 and the reported cases due to un-natural causes among non-Kuwaiti infants increased from 52.6% in 2003 to 56% in 2006. The number of Kuwaiti infants who died from un-natural causes had increased from 47.4% in 2003 to 61.9% in 2004 and decreased to 59% in 2005. The reported medico-legal cases of infant deaths due to un-natural causes decreased from 52.6% in 2003 to 38.1% in 2004 and again increased slightly to 41% in 2005. The number of reported cases of Kuwaiti infants who died from un-natural causes showed a decreasing trend except in 2005. Similarly, the number of reported medico-legal cases for non-Kuwaiti infants who died from un-natural causes also showed decreasing trends. Taken together, the results clearly showed that there was no significant difference ($p > 0.05$) in the number of reported medico-legal cases of infant deaths due to un-natural causes for Kuwaiti and Non-Kuwaiti residents comparing the values for 2003 with 2004, 2005 or 2006.

5.8. Gender and infant deaths

The results of this study have shown that more cases were reported for deaths among male infants compared to infant girls. The question which now arises is: Does an increase in the male infant mortality rate imply changes in socio-cultural attitudes in the Kuwaiti family? The result of the reported medico-legal cases of deaths due to natural and un-natural causes among infant boys and girls in Kuwait during the study period are as follow:

The total infant male mortality rate during the study period 2003–2006 was 62.7% compared to the reported female mortality rate which was 37.3% during the same period. The reported medico-legal cases of deaths among infant males increased from 53.7% in 2003 to 69.5% in 2006. In contrast, infant female mortality rates decreased from 46.3% in 2003 to 30.5% in 2006. The results revealed no significant ($p > 0.05$) increase or decrease of reported medico-legal cases of either male or female infant mortality rate, respectively in Kuwait comparing 2003 with either 2004, 2005 or 2006.

5.9. Reported medico-legal cases of infant deaths due to un-natural causes in Kuwait according to gender

The number of male infants who died due to un-natural causes was 66. This represented 75.9% of the total reported cases of deaths due to un-natural causes in Kuwait. Similarly, the number female infants who died in Kuwait due to un-natural causes were 21. Again, this represented 24.1% of the total reported cases due to un-natural causes in Kuwait. The reported medico-legal cases of deaths among male infants due to un-natural causes increased to 76% in 2006 compared to 57.9% in 2003 while the reported medico-legal cases of deaths for female infants decreased from 42.1% in 2003 to 24% in 2006. There was a significant difference in male and female mortality rate in 2003 compared to 2004, 2005 and 2006 ($\chi^2 = 8.1$ DF = 3, $p = 0.04$) and also in 2004 vs 2005 ($\chi^2 = 6.7$ DF = 1, $p = 0.01$) 2005/2006 ($\chi^2 =$, DF = , $p =$). This meant that there was a significant difference in the reported medico-legal cases of deaths among infant males due to un-natural causes in 2003 compared to the reported cases in either 2004, 2005 or 2006 and in 2004 compared to 2005. But there was no significant difference in the reported cases for 2005 compared to 2006. The male mortality rate increased from 57.9 in 2003 to 71.4% in 2004 and 95.5% in 2005. This value subsequently, decreased to 76% in 2006. Similarly, the female infant mortality rate decreased to 28.6% in 2004 and 4.5% in 2005 and it subsequently, increased again to 24% in 2006.

5.10. Infant mortality rate and literacy rate in the Arab countries

A comparison of infant mortality rate between Kuwait and other Arab countries is a valuable indicator of good health care of each nation within the Arab world. The present results have demonstrated an interesting relationship between national literacy rates (NLR) and IMR.

The infant mortality rates were negatively correlated with literacy rates of the population. This observation supports the results of the previous studies^{17,18} that the infant mortality is negatively correlated with literacy of the country. However, the average Kuwaiti literacy rate for the study period was 87.8 and the corresponding average IMR in Kuwait for the study period was 9. Kuwait is second lowest in infant mortality rate when compared to other Arab countries. The high literacy in any country is a crucial factor in the Government's campaign for the reduction of infant mortality. The high literacy in the country is a factor that contributed to the reduction of infant mortality in the region.

This confirms the results from previous studies that infant mortality is inversely correlated to literacy rate of a country.^{17,19} Iraq is an exception and the present political situation is responsible for the high infant mortality rate in the country.²⁰ Yemen is the second highest in infant mortality rate. Arab countries can reduce their infant mortality rates through campaigns for better public education and health emphasizing on more prenatal care and proper care of infants (i.e. reduction in SIDS death and smoking, better nutrition and improved safety measures in the home, etc.).²¹

6. Conclusions

The data analysis reported in this study has shown the following:

1. The average IMR rate in Kuwait during the study period was better than the IMR average for developing countries and the IMR average for the world during the same study period. In general, these figures for Kuwait are even better than the average for Middle East and North Africa.
2. More infants died in 2006 compared to 2003–2005, but there was no statistical significant decrease or increase of total infant deaths and reported medico-legal cases of infant deaths in Kuwait during the study period (2003–2006).
3. More medico-legal cases were reported for deaths among Kuwaiti infants in 2004, 2005 and 2006 compared to non-Kuwaiti infants, but in 2003 more non-Kuwaiti infant deaths were reported compared to Kuwaiti infants and cases of deaths among boys was markedly more than the number of reported medico-legal cases for girls between 2003 and 2006.
4. More infants died due to natural causes, but there was no statistical significant difference in the reported medico-legal cases of infant deaths due natural and un-natural during the study period.
5. In reported medico-legal cases of infant deaths due to natural causes category, more infants died due to infections, followed by SIDS, Premature birth and congenital abnormalities and stillbirth. In contrast, in the reported medico-legal cases of deaths

due to un-natural category, more infants died due to domestic accidents followed by RTA and infanticide.

7. More male infants died due to infections and SIDS compared to females. In contrast, more females died due to premature birth and congenital abnormalities and stillbirth compared to males. There was no significant difference in the data for 2003 compared to the data for 2004, 2005 or 2006.
8. More Kuwaiti infants died due to RTA and domestic accidents. In contrast, only non-Kuwaiti infants died from infanticide

Ethical approval

None.

Funding

None declared.

Conflict of interest

We Dr Salah Al-Waheed and Dr Nadia Al-Kandary have nothing to declare and no conflict of interest.

References

1. Mathews T, Menacker F, Mac-Dorman M. Infant mortality statistics from the 2000 period linked birth/infant death data set. *Natl Vital Stat Rep* 2002;50: 1–28.
2. Mitchell E. Recommendations for sudden infant death syndrome prevention: discussion document. *Arch Dis Child* 2007;92(2):155–9.
3. Ruys J, de J, Brand R, Engelberts A, Semmekrot B. Bed sharing in the first four months of life: a risk factor for sudden infant death. *Acta Paediatr* 2007;96(10): 1399–403.
4. Bourget D, Grace J, Whitehurst L. A review of maternal and paternal filicide. *J Am Acad Psychiatry Law* 2007;35:174–82.
5. Rizvi S, Hatcher J, Jehan I, Qureshi R. Maternal risk factors associated with low birth weight in Karachi: a case–control study. *East Mediterr Health J* 2007;13: 64–9.
6. Margaret G. Maternal infanticide associated with mental illness: prevention and the promise of saved lives. *J Am Psychiatry* 2004;161:1548–57.
7. Hennekens C, Buring J. *A dictionary of epidemiology* In: *Epidemiology medicine*. 4th ed.; 2001. p. 120–6.
8. Rognum T. *Definition and pathologic features, sudden infant death syndrome: problems, progress and possibilities*. Arnold Press; 2001. p. 4–71.
9. Health Kuwait. *Department of medical records*. XLIII ed.; 2007. p. 130–5.
10. World Health Organization. *Neonatal and perinatal mortality: country, regional and global estimates*, 2(1993); 2006. p. 129–46. Geneva.
11. UNICEF. *The state of the world's children*; 2005.
12. UNICEF. *The state of the world's children*; 2006.
13. Mitchell E, Hutchison L, Stewart A. The continuing decline in SIDS mortality. *Arch Dis Child* 2007;92(7):625–6.
14. Mitchell E. A sudden infant death syndrome: should bed sharing be discouraged? *Arch Pediatr Adolesc Med* 2007;161(3):305–6.
15. International Road Federation. *World road statistics*. Geneva: IRF; 2005. p. 43–8.
16. Rizvi S. Marriage and morals in Islam: contraceptives and abortion. *J Islam Educ* 2006;76:1211–6.
17. Shawky S. Infant mortality in Arab countries sociodemographic, perinatal and economic factors. *East Mediterr Health J* 2001;(6):956–65.
18. Al-Nahedh N. Infant mortality in rural Riyadh region of Saudi Arabia. *J R Soc Health* 1997;117(2):106–9.
19. Hertz E, Hebert J. Social and environmental factors and life expectancy, mortality, and maternal mortality rates: results of a cross-national comparison. *Soc Sci Med* 1994;39(1):105–14.
20. Jeralyn A. Infant mortality soars in Iraq, section war in Iraq. *J Psych* 2007;1(16): 50–5.
21. Alsobah K. Infant mortality. Ministry of Health. *Kuwait Health J* 2007;21:45–7.